Listing of Pending Claims:

1. (Original) A method of autofocus of an optical instrument for viewing an object and having an auto-focusing mechanism, comprising the steps of:

step 1: acquiring a first digital image of the object through the optical instrument, the first digital image comprising a plurality of pixels having pixel values;

step 2: applying a digital gradient filter to at least some of the pixel values of the first digital image to obtain a focus score for the first digital image; wherein the digital gradient filtering step includes a smoothing operation having a settable spatial extent.

2. (Original) The method of claim 1, wherein the spatial extent of the smoothing function is manually and/or electronically settable.

3. (Original) A method of autofocus for an optical instrument for viewing an object and having an auto-focusing mechanism, comprising the steps of:

step 1: acquiring a first digital image of the object through the optical instrument, the first digital image comprising a plurality of pixels having pixel values;

step 2: applying a digital filter to at least some of the pixel values of the first digital image to obtain a focus score for the first digital image; wherein the digital filter is defined by a mathematical smoothing function having a negative and positive lobe around the origin thereof, the mathematical smoothing function having only one zero crossing and being limited in spatial extent in that it extends over s distance smaller than or equal to the image size and extends at least over three pixels either side of a pixel whose value is being filtered.

4. (Previously presented) The method according to claim 1, further comprising:

step 3: moving the object relative to the optical instrument along the optical axis thereof and acquiring a second digital image and a second focus score therefore in accordance with the method of steps 1 and 2;

step 4: continue moving the object relative to the optical instrument along the optical axis thereof in the same direction in accordance with steps 1 to 3 to acquire at least three digital images and first to third focus scores associated therewith; and

step 5: determining from the first to third focus scores a focus position for the object and moving the object and/or the optical instrument to this position.

5. (Previously presented) The method according to claim 1, further comprising:

step 3: determining a first plurality of focus scores for the first digital image using the digital gradient filter with a first plurality of spatial extents by applying for each spatial extent the method steps 1 and 2;

step 4: moving the object relative to the optical instrument along the optical axis thereof and acquiring a second digital image and a second plurality of focus scores therefore in accordance with the method of step 3;

step 5: continue moving the object relative to the optical instrument along the optical axis thereof in the same direction in accordance with steps 1 to 3 to acquire at least three digital images and first to third pluralities of focus scores associated therewith; and

step 6: determining from the first to third plurality of focus scores a focus position for the object and moving the object and/or the optical instrument to this position.

6. (Previously presented) The method according to claim 1, wherein the optical instrument is a microscope.

7. (Previously presented) The method according to claim 4, wherein the determining step includes fitting the focus scores to a polynomial function and moving the object and/or the optical instrument to a position related to a maximum of the polynomial function.

8. (Previously presented) The method according to claim 1, wherein the digital filtering function is a one or two-dimensional function.

9. (Previously presented) The method according to claim 1, wherein the digital filtering function is a Gaussian function.

10. (Previously presented) The method according to claim 1, further comprising

the step of selecting the spatial extent of the digital filtering function.

11. (Original) An optical instrument for viewing an object and having an auto-focusing mechanism, the optical instrument being adapted to acquire a first digital image of the object through the optical instrument, the first digital image comprising a plurality of pixels having pixel values; and the auto-focusing mechanism having a digital gradient filter to filter at least some of the pixel values of the first digital image and to obtain a focus score for the first digital image, wherein the digital gradient filter includes a smoothing function having a settable spatial extent.

12. (Original) The optical instrument of claim 11, wherein the spatial extent of the smoothing function is manually and/or electronically settable.

13. (Original) An optical instrument for viewing an object and having an auto-focusing mechanism, the optical instrument being adapted to acquire a first digital image of the object through the optical instrument, the first digital image comprising a plurality of pixels having pixel values; and the auto-focusing mechanism having a digital filter to filter at least some of the pixel values of the first digital image to obtain a focus score for the first digital image wherein the digital filter is defined by a mathematical smoothing function having a negative and positive lobe around the origin thereof, the mathematical smoothing function having only one zero crossing and being limited in spatial extent in that it extends over a distance smaller than or equal to the image size and extends at least over three pixels either side of a pixel whose value is being filtered.

14. (Previously presented) The optical instrument according to claim 11, further comprising: a drive device for moving the object relative to the optical instrument along the optical axis thereof.

15. (Previously presented) The optical instrument according to claim 11, the instrument being further adapted for determining from a plurality of focus scores for a plurality of images a focus position for the object.

16. (Original) The optical instrument according to claim 15 further adapted for fitting the plurality of focus scores to a polynomial function and determining the focus position as a position related to a maximum of the polynomial function.

17. (Previously presented) The optical instrument according to claim 15, the instrument being adapted to determine for each image a plurality of focus scores using a plurality of spatial extents for the digital filter.

18. (Previously presented) The optical instrument according to claim 11, wherein the digital filtering function is a one or two-dimensional function.

19. (Previously presented) The optical instrument according to claim 11, wherein the digital filtering function is a Gaussian function.

20. (Previously presented) The optical instrument according to claim 11, wherein the optical instrument is a microscope.

21. (Previously presented) The optical instrument according to claim 13, wherein the extent of the digital filtering function is manually and/or electronically settable.

22. (Original) An auto-focusing mechanism for an optical instrument, the optical instrument being provided for viewing an object and for acquiring a digital image of the object, the digital image comprising a plurality of pixels having pixel values; the mechanism comprising: a digital gradient filter to filter at least some of the pixel values of the digital image to obtain a focus score for the digital image, wherein the digital gradient filter includes a smoothing function having a settable spatial extent.

23. (Original) The autofocus mechanism according to claim 22, wherein the spatial extent of the smoothing function is electronically and/or manually settable.

24. (Original) An auto-focusing mechanism for an optical instrument, the optical instrument being provided for viewing an object and for acquiring a digital image of the object, the digital image comprising a plurality of pixels having pixel values; the mechanism comprising: a digital filter to filter at least some of the pixel values of the digital image to obtain a focus score for the digital image wherein the digital filter is defined by a mathematical smoothing function having a negative and positive lobe around the origin thereof, the mathematical smoothing function having only one zero crossing and being limited in spatial extent in that it extends over a distance smaller than or equal to the image size and extends at least over three pixels either side of a pixel whose value is being filtered.

25. (Previously presented) The mechanism according to claim 22, wherein the digital filtering function is a one or two-dimensional function.

26. (Previously presented) The mechanism according to claim 22, wherein the digital filtering function is a Gaussian function.

27. (Previously presented) The mechanism according to claim 22, comprising the mechanism being adapted for determining from a plurality of focus scores for a plurality of images a focus position for the object.

28. (Original) The mechanism according to claim 27, further adapted for fitting the plurality of focus scores to a polynomial function and determining the focus position as a position related to a maximum of the polynomial function.